

Exploring Equivalent Fractions

Brief Overview:

During the three days, students will develop an understanding of equivalent fractions. For this unit, students will need the prerequisite skills of representing and comparing fractions with like denominators. They will also need to be able to place a fraction on a number line labeled 0, $\frac{1}{2}$, 1.

NCTM Content Standard/National Science Education Standard:

Number and Operations

- Understand numbers, ways of representing numbers, relationships among numbers, and number systems
- Develop an understanding of fractions as parts of unit wholes, as parts of a collection, as locations on number lines, and as divisions of whole numbers;
- Use models, benchmark, and equivalent forms to judge the size of fractions;
- Recognize and generate equivalent forms of commonly used fractions, decimals, and percents.

Grade/Level:

4/5

Duration/Length:

60 minutes per day for 3 days

Student Outcomes:

Days One and Two

- Compare fractions to determine fraction equivalency
- Create equivalent fractions using manipulatives
- Communicate orally and in writing their understanding of equivalent fractions
- Identify equivalent fractions

Day Three

Compare and order fractions between 0 and 1 on a number line

Students will recognize difference between equivalent and non-equivalent fractions.

Materials and Resources:

Teacher Resource 1, "Fraction Strips"

Teacher Resource 2, "Pizza Story"

Teacher Resource 3, "Pizza Answer Key"

Teacher Resource 4, "Reteaching Template"

Teacher Resource 5, "Fraction Circles"

Teacher Resource 6, "Fraction Squares"

Teacher Resource 7, "1 Whole Grouping Squares"

Teacher Resource 8, " $\frac{1}{2}$ Squares"

Teacher Resource 9, " $\frac{1}{3}$ Squares"

Teacher Resource 10, " $\frac{1}{4}$ Squares"

Teacher Resource 11, " $\frac{1}{5}$ Squares"

Teacher Resource 12, " $\frac{1}{6}$ Squares"

Teacher Resource 13, "It's Their Birthday"

Teacher Resource 14, "Birthday Cake Answer Key"

Teacher Resource 15, "Set Cards"

Teacher Resource 1, 5, and 6 need to be cut into pieces.

Teacher Resources 7-12 must be cut out and pasted on index cards.

Newsprint

Index cards

Teacher Resources 1, 5, and 6 are used if manipulatives are not available.

Student Resource 1, "Birthday Cake Circle"

Student Resource 2, "Birthday Cake Extension"

Student Resource 3, "See What You Know"

Development/Procedures:

Lesson 1

Pre-Assessment/Launch

- Arrange students in groups of 4 prior to the lesson. Distribute precut fraction strips found on Teacher Resource 1, "Fraction Strips".
- Direct students to discuss what they had for dinner last night.
- Tell the students that they will be listening to a conversation between two children discussing what they had for dinner.
- Use Teacher Resource 2, "Pizza Story", to read the conversation aloud to the students.
- Direct the students to discuss who had the correct answer- Zeb or Niko. On a piece of newsprint, the group will finish the sentence, "We know ____ is correct because_____". Use words, numbers, and/or pictures to show how you made your decision." Use Teacher Resource 3, "Pizza Answer Guide".
- Monitor students for participation and listen for strategies students used to find the answer during the discussion.

Listen/look for...

Fraction vocabulary
comparisons
fraction strips

One student from each group will then share the group's response.
Post each group's response

Teacher Facilitation -

- Tell students: "Today you will be working with fraction strips to understand fractions. At the end of the class, you will have an opportunity to revisit your decision about Niko and Zeb. You will also have a chance to change your original answer."
- Have students show $\frac{1}{2}$ using the fraction strips.
- Ask your students to find how many $\frac{1}{4}$ fraction strips equal $\frac{1}{2}$.
- Have students share what they discovered, and record the picture and the fraction on chart paper.
- Ask students to find how many $\frac{1}{8}$ fraction strips equal $\frac{1}{2}$.
- Have students share what they discovered and the teacher posts this for the class to see.
- As a group, students are to create $\frac{1}{2}$ using fourths, fifths, sixths, eighths, tenths, and twelfths.

- Have students individually record their findings by illustrating three of the fractions in the math journal.
- Students can share what they discovered.
- Post this for the class to see.

Student Application

- Direct students to work independently to see if they can make $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{1}{6}$ using fraction strips for fourths, fifths, sixths, eighths, tenths and twelfths.
- Students should share what they discovered. Results can be posted in a display.
- Students will record their results as they did for $\frac{1}{2}$.

Teacher Facilitation

- Have the class examine the fractions on the chart paper in the $\frac{1}{2}$ box to reinforce that they are equal to $\frac{1}{2}$.
- Tell students that these fractions are called equivalent fractions because they are fractions that have the same value.
- Have students find equivalent fractions using fraction strips for $\frac{1}{3}$ following the modeled process above.
- Repeat the same process for the other fractions.

Embedded Assessment -

Have students review the pizza answer from the launch. They should discuss their original answer with their group and change it if necessary. If changes are made, they need to explain why orally.

Reteaching/Extension -

Print blank copies of Teacher Resource 4, "Reteaching Template" for reteaching purposes. Four copies per students are needed.

Reteaching-Revisit creating equivalent fractions using http://www.bgfl.org/bgfl/custom/resources_ftp/client ftp/ks2/maths/fractions/level2.htm

Begin by asking why the parts are labeled with fractions.

- Direct students to look at the whole and determine how many of each fractional part equals the whole. As they discuss each

fraction, the students will move the virtual pieces onto the template.

- Model coloring and labeling fractions equivalent to 1 on the template
- Clear the board when complete by clicking on main menu, click activities, and click level two.

Part 2

- Begin by asking how to build $\frac{1}{2}$ with the virtual fraction pieces.
- Manipulate $\frac{1}{2}$ into place and use the other fractions to build $\frac{1}{2}$.
- Have students complete blank template by coloring and labeling the equivalent fraction as they did for 1.
- Repeat the same process for $\frac{1}{4}$ and $1/8$.
- Have students complete four templates representing equivalent fractions for 1, $\frac{1}{2}$, $\frac{1}{4}$, and $1/8$.

Extension- Use manipulatives to find equivalent fractions for $2/3$, $\frac{3}{4}$, and $4/5$.

Lesson 2

Pre-Assessment/Launch-

- Distribute 2 sets of precut fraction circles and squares. Teacher Resource 5, "Fraction Circles" and Teacher Resource 6, "Fraction Squares".
- Label each student table with one of the following cards: 1, $\frac{1}{2}$, $1/3$, $1/5$, $\frac{1}{4}$, and $1/6$. (White cards from Teacher Resource 7-12, "Grouping Cards").
- Place the equivalent fraction cards, Teacher Resource 7-12, "Grouping Cards" (shaded cards), on a desk near the door of the classroom.
- Instruct students as they enter to take one card and sit at the table with the fraction equivalent to their card.
- Have students discuss how they know they are at the correct table.
- Monitor the groups for participation and listen for strategies students use to find the correct table.

Teacher will listen/look for...

- fraction vocabulary

- comparisons
- discussion of size
- use of fraction squares and/or circles
- Share the table fraction and their equivalent fraction.
- Ask the students: "How do you know the fractions are equivalent?" "Can you find equivalent fractions differently?" Explain some strategies you use to find equivalent fractions.

Teacher Facilitation -

- Add new fractions to yesterday's chart and review examples from yesterday.
- Direct students to work with partner and review the definition for equivalent fractions. Provide time to share some definitions aloud.

Student Application -

Distribute a copy of Teacher Resource 13, "It's Their Birthday". Josh and Justin are twins who are celebrating their 12th birthday. They couldn't decide on the flavor of the frosting, so they have three flavors. Their mom ordered a cake with $\frac{1}{2}$ chocolate, $\frac{1}{4}$ vanilla, and $\frac{1}{4}$ strawberry frosting.

You are the bakers. Working with a partner, use the pre-cut fraction circles/squares to create a cake with equivalent fractional parts of frosting. (Teacher Resources 5 and 6) Students will illustrate their cakes and label the parts.

Share student cakes amongst the group.

Have students go on a "Gallery Walk" to see other cakes.

(A gallery walk is when students orderly walk around the classroom and view other's work.)

Discuss different ways the students frosted the cake. Ask the students, "What is one way to show $\frac{1}{2}$ of the cake in chocolate frosting? Is there another way?"

Record answers on chart paper and compare them to yesterday's chart.

Repeat the process for $\frac{1}{4}$.

Part 2

- Distribute Student Resource 1, "Birthday Cake Circles."

- Have students individually complete cake paper by coloring and labeling $\frac{1}{2}$ and $\frac{1}{4}$ to represent the frosting possibilities. See Teacher Resource 14, "Birthday Cake for the answer key".
- Select students to record different cake designs on a transparency. The transparency should have a variety of representations of cake designs. Some cake designs on the transparency may be incorrect. Be aware of these misconceptions and discuss them.
- Students will discuss and check work with a partner. Students are looking for similarities and differences. If differences are found, students discuss why.

Embedded Assessment-

Use the transparency to initiate a class discussion about the partner discussions.

Reteaching/Extension -

Reteach-

- Review equivalent fractions by creating fractions from paper.
- Provide each student with 4 equal pieces of paper.
- Fold a sheet of paper in half and label each part.
- Repeat for fourths, eighths, and sixteenths.
- Using the paper parts model how $\frac{2}{4}$ equals $\frac{1}{2}$ by placing $\frac{2}{4}$ on top of $\frac{1}{2}$ to show that they are the same size. Repeat for other equivalent fractions.

Extension-

Distribute Student Resource 2, Birthday Cake Extension.

Create and label several cakes using equivalent fractions to represent the same amount of chocolate, vanilla, or strawberry frosting .

Lesson 3

Pre-Assessment/Launch -

- Set up the classroom as directed in Lesson 2.
- Instruct the students to take a card and sit at a table with students to represent a group of fractions that are not equivalent.

- Tell students to discuss how they know they are at the correct table.
- Monitor the groups for participating and listen for strategies students use to find a table of different fractions.

Listen/look for :

- fraction vocabulary
- comparisons
- use of fraction squares and/or circles
- Ask a volunteer from each group to state the fractions in the group and how they decided the fractions were not equivalent.
- Write the group results on chart paper titled Fractions Not Equal to...
- Students will need to recognize the difference between equivalent and non-equivalent fractions.

Teacher Facilitation -

- Give each group a piece of yarn/clothesline to use as a number line.
- Instruct the students to label 0 and 1 using sticky notes.
- Distribute Teacher Resource 15," Fraction Card Set #1" to each group of students. This set does not have any equivalent fractions.
- Tell the students to place the fraction cards on the number line and try to be as accurate as possible.
- Make a class number line and select students to place a fraction card on it to model the correct placement for the class.
- Ask the student to explain how he/she decided on its placement.
- Repeat the process using "Fraction Card Set # 2" and "Fraction Card Set # 3". These sets include equivalent fractions.

Student Application -

- Distribute "Fraction Card Set #4".
- Tell the students to place the fraction cards on the number line and try to be as accurate as possible.
- Then have students place their original fraction cards on the correct places on the number line.
- Ask a volunteer from each group to place their group's fraction cards on the class number line.

- Ask the students to explain how they decided on the placement of the fractions.
- Ask the class if they agree on the placement, address disagreements, and make changes as necessary.
- Encourage students to state what they notice about equivalent fractions on a number line.
- Ask students if the order of the equivalent fractions located in one place make a difference.
- Guide students to understand the idea that equivalent fractions are on the same place on the number line because they are the same distance from zero.

Embedded Assessment -

Observe students while placing fractions on the number line.

Reteaching/Extension -

Reteaching-

<http://www.shodor.org/interactivate/activities/EquivFractionPointer/>

(This site randomly chooses how the first figure will be divided. Direct students to continue to click next question until the first figure represents $\frac{1}{2}$.)

1. Ask students to state what fraction of the first figure is shaded and identify its placement on the number line.
2. Ask the students to also identify what fraction of the other figures is shaded and explain the fraction's placement on the number line.
3. Tell students they will be creating an equivalent fraction in the second figure and watching how its placement changes on the number line.
4. Tell students to click the plus column to create a figure divided into four equal parts.
5. Direct the students' attention to the green fraction on the number line and ask the students why the denominator has changed to a 4.
6. Tell the students to click on one-fourth to shade the figure.
7. Direct the students' attention to the green fraction on the number line and discuss its new placement.

8. Tell the students to click on another fourth to shade the same figure.
9. Direct the students' attention to the green fraction on the number line. Discuss how the numerator has changed and its new placement on the number line.
10. Ask students what they notice about the equivalent fractions.
11. Click check to confirm the answer is correct.
12. Tell the students to divide the blue figure into 6 equal parts by clicking on the + column.
13. Repeat steps 5-11.
14. Tell students that they will be working independently to create more equivalent fractions.
15. Instruct students to predict how the placement of the fraction on the number line will change and why it is changing.
16. End the session by discussing what the students noticed about the placement of equivalent fractions on the number line.

Extension- Using the computer, play Make a Match at <http://pbskids.org/cyberchase/games/equivalentfractions/> up to level three. During this game students are matching various shapes with the equivalent fraction it represents.

Summative Assessment:

Distribute copies of Student Resource 3, "See What You Know" and fraction manipulatives (fractions strips, fraction squares, and/or fraction circles) Read the assessment aloud to the students. Tell the students they can use the manipulatives to help them find equivalent fractions. Clarify the directions as needed. Answers can be found on Teacher Resource 16.

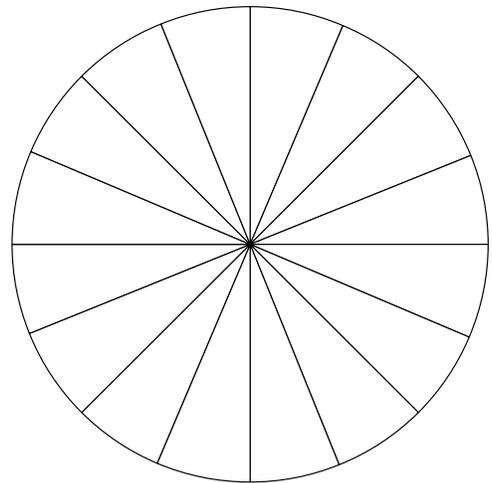
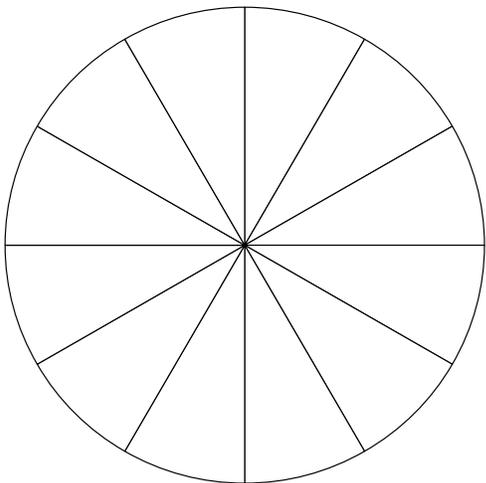
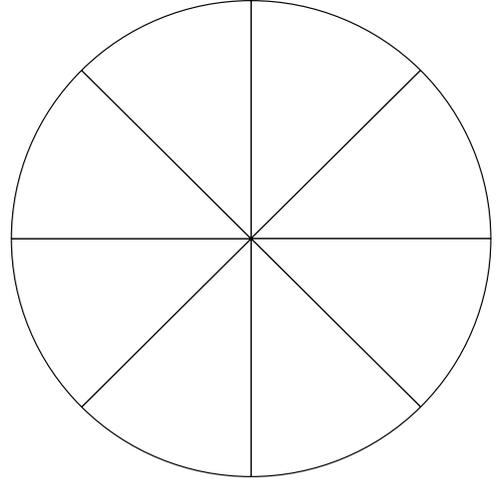
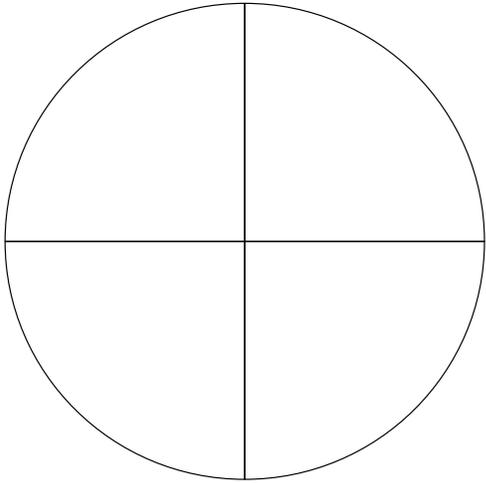
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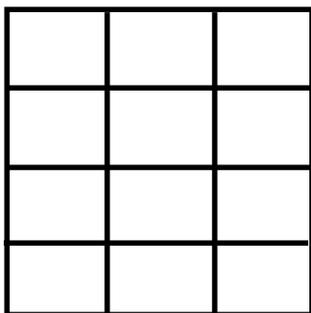
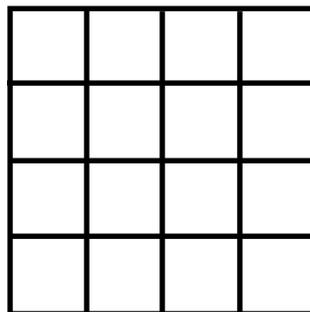
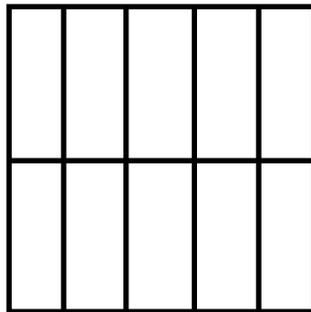
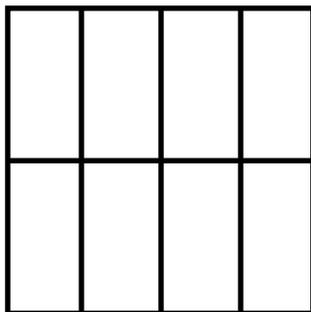
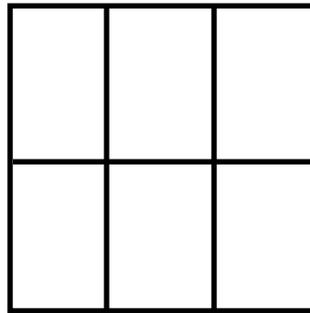
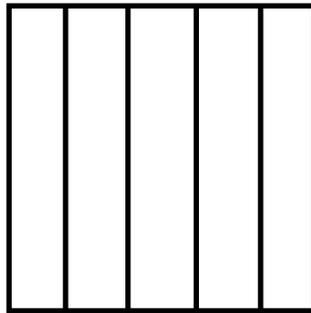
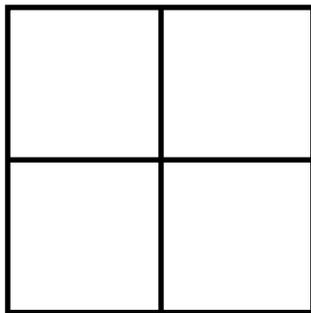
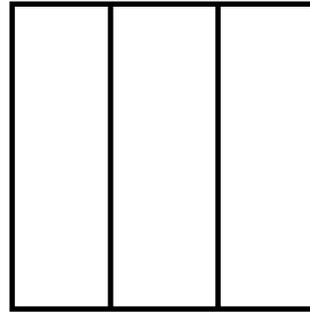
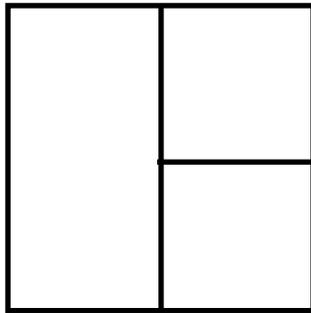
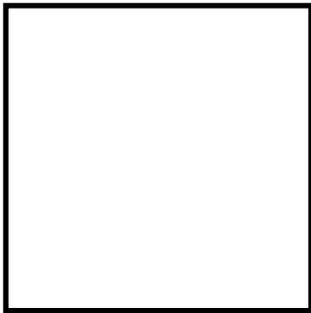
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Birthday Cake Circles

Use crayons to ice the following birthday cakes so that one-half of each cake is chocolate, one-fourth vanilla, and one-fourth strawberry.



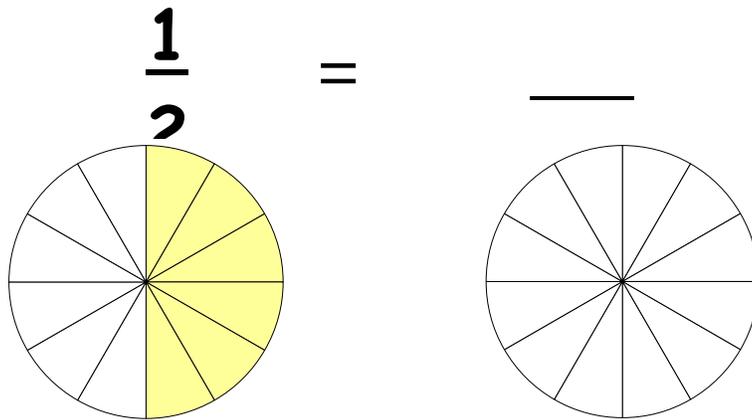
Birthday Cake Extension



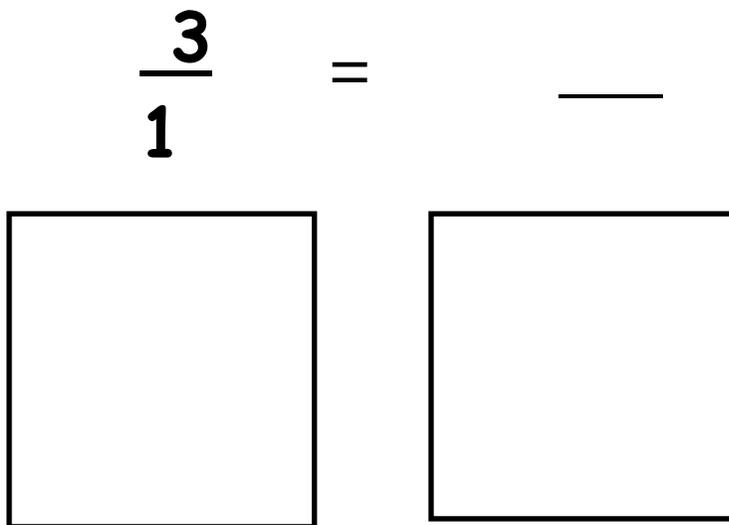
See What You Know!!

Name _____ Date _____

1. Color each circle to show an equivalent fraction to the fraction named. Write the equivalent fraction.



2. Shade the first square to represent the fraction 3/12. Shade the second square to represent a fraction equivalent to 3/12.



3. Complete the chart by writing two equivalent fractions in each column.

Equivalent Fractions

$1/2$	$1/3$	$1/4$

4. Your class was having a discussion about equivalent fractions. Trevor said that $4/16$ is greater than $1/4$. Samantha said that $4/16$ is equal to $1/4$.

Part A

Is Trevor or Samantha correct? _____

Part B

Use what you know about equivalent fractions to explain why your answer is correct. Use words, pictures, and/or numbers in your explanation.

Pizza Story

Lisa and Zeb were talking about what they had for dinner last night. Lisa said, “Zeb, last night my family bought a large pizza and I ate $\frac{1}{4}$ of the pizza,” Zeb replied, “I can eat more pizza than you.



Tuesday night my mom bought a large pizza and I ate $\frac{2}{8}$ of the pizza.” Niko said, “Zeb, you didn’t eat more than Lisa. You ate the same amount.”

Who is correct, Zeb or Niko?

Pizza Story Answer Key

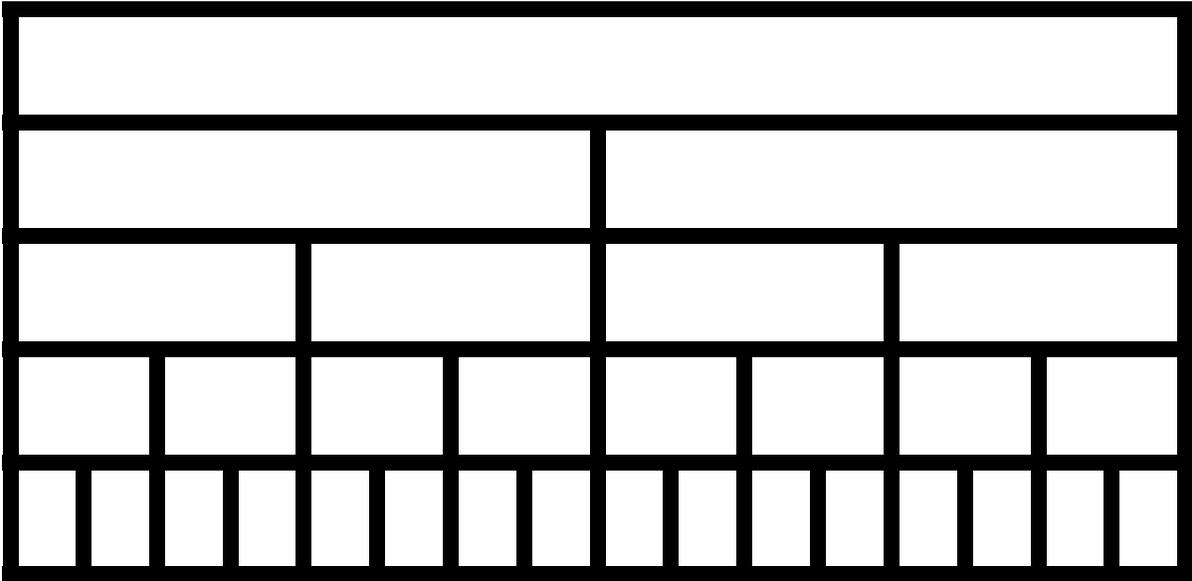
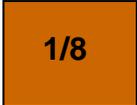
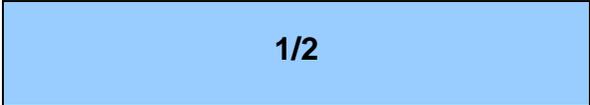
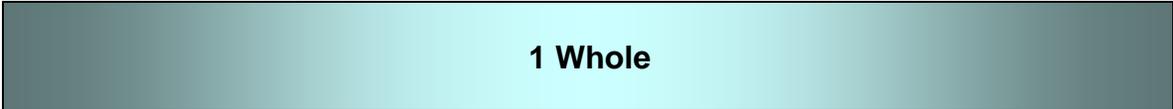
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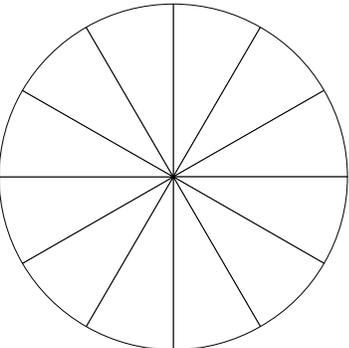
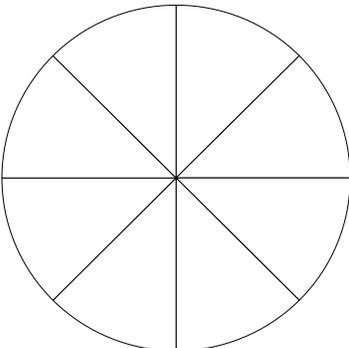
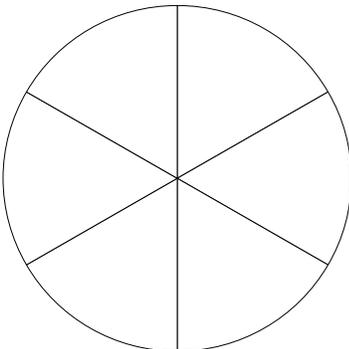
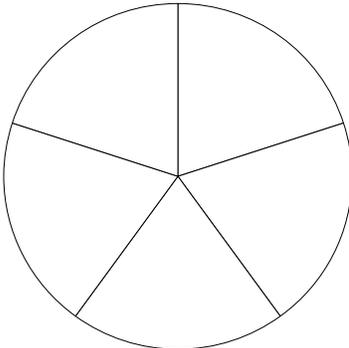
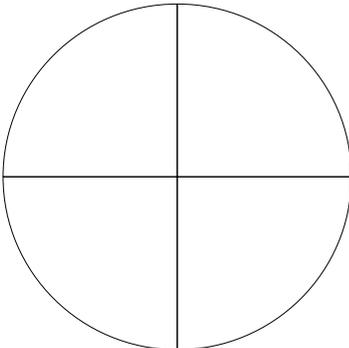
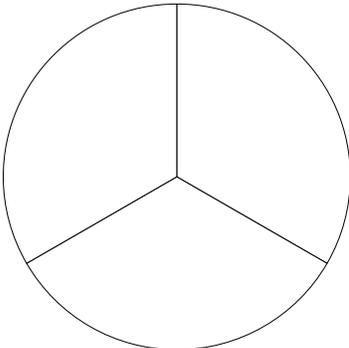
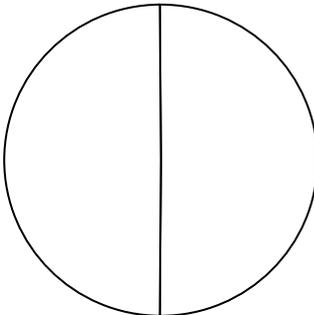
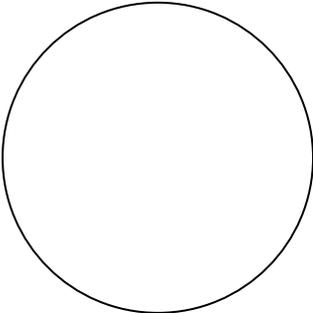
Tuesday night my mom bought a large pizza and I ate $\frac{2}{8}$ of the pizza.” Niko said, “Zeb, you didn’t eat more than Lisa. You ate the same amount.”

Who is correct, Zeb or Niko? Niko $\frac{2}{8} = \frac{1}{4}$

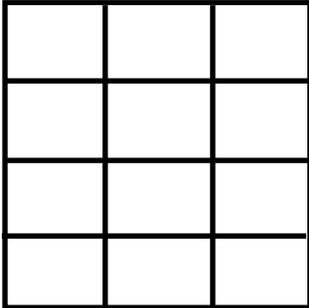
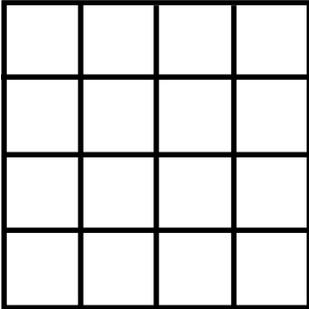
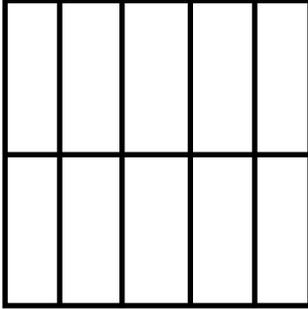
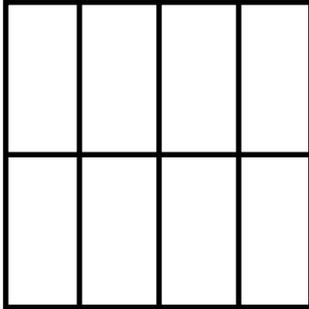
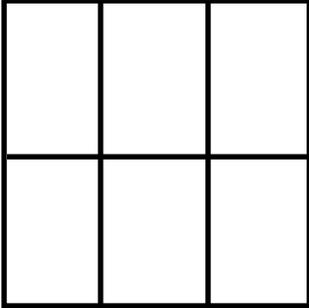
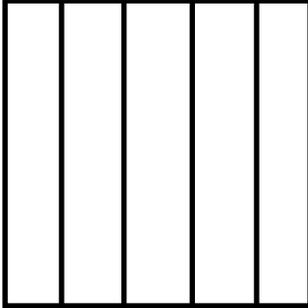
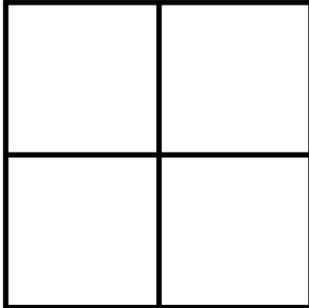
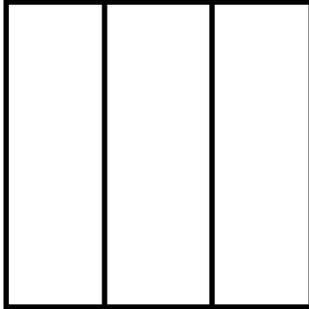
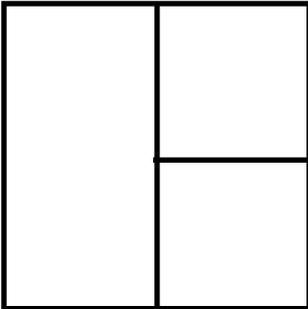
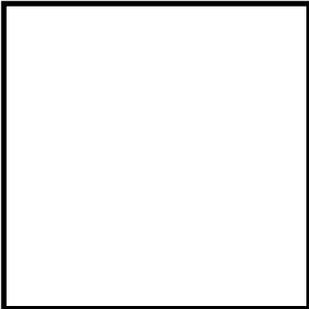
Reteaching Template



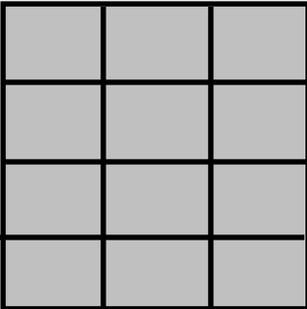
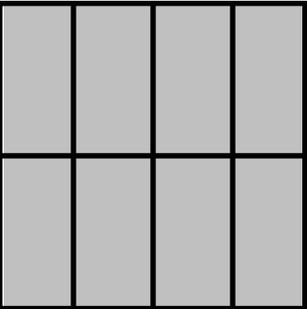
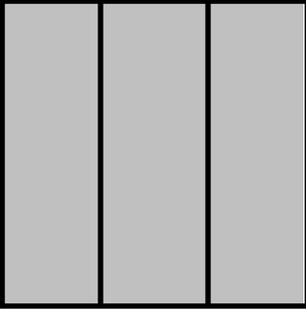
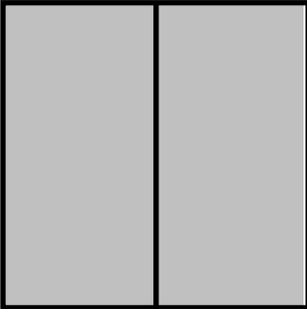
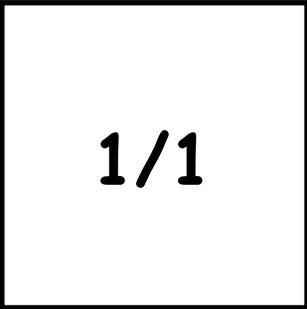
Fraction Circles



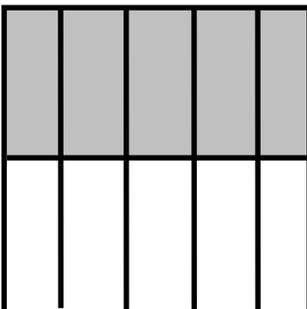
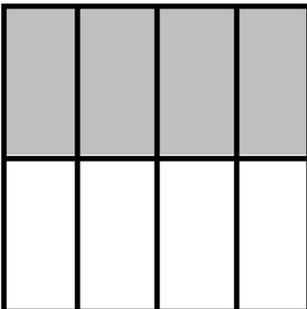
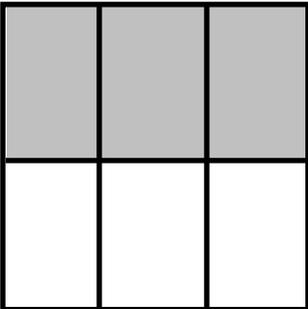
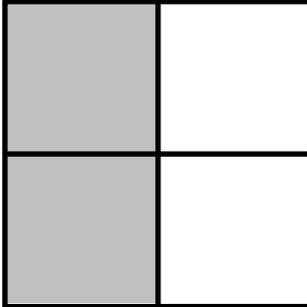
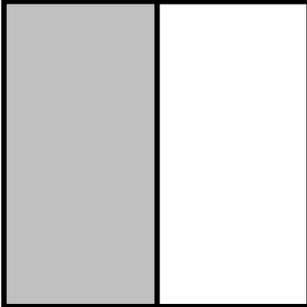
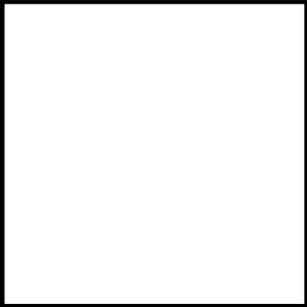
Fraction Squares



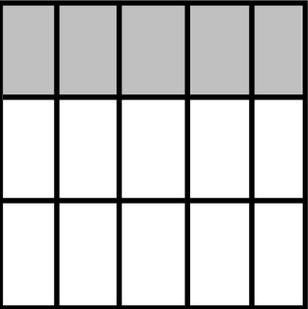
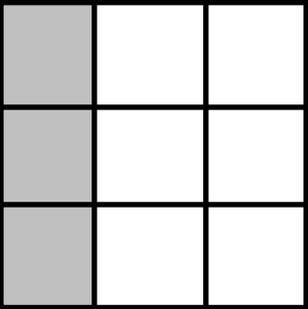
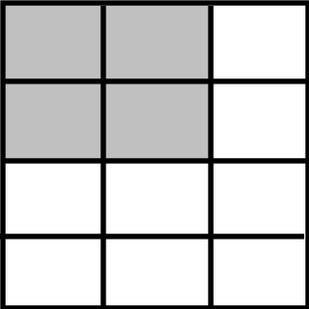
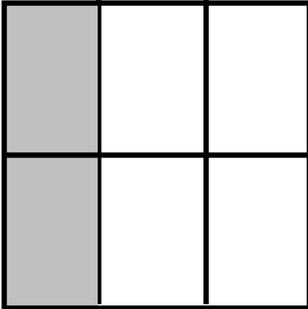
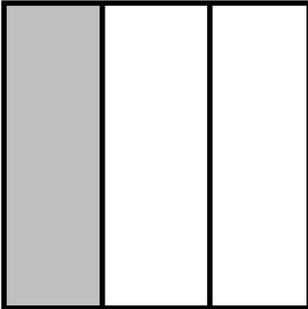
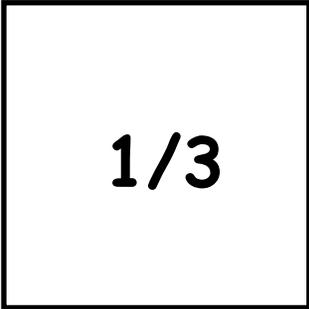
1 Whole Grouping Cards



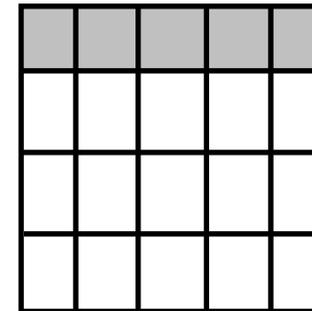
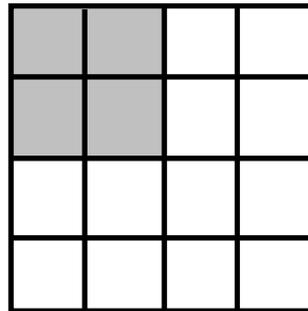
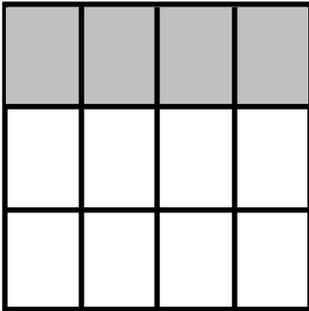
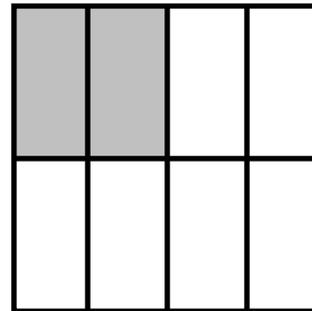
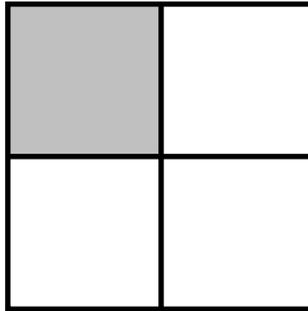
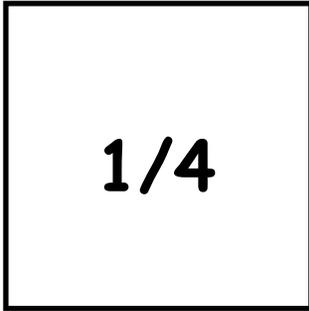
1/2 Grouping Cards



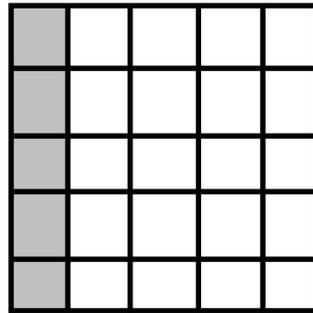
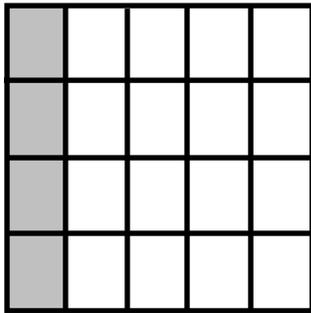
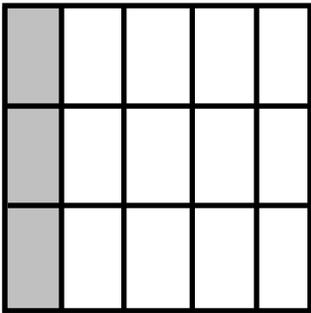
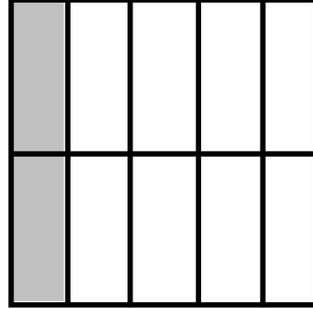
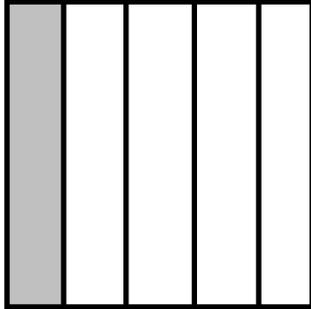
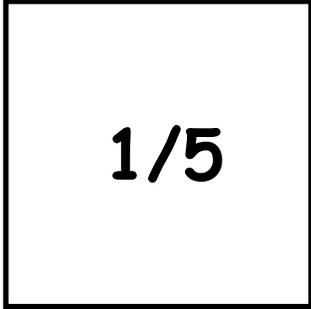
1/3 Grouping Cards



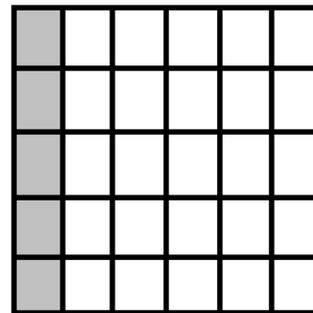
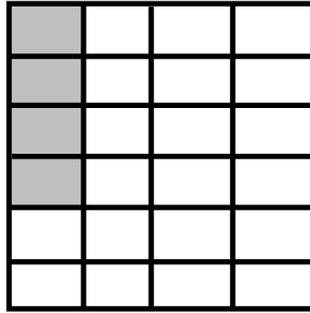
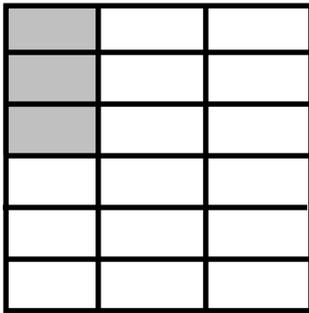
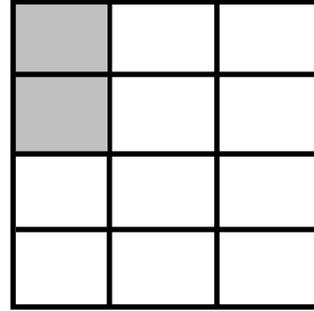
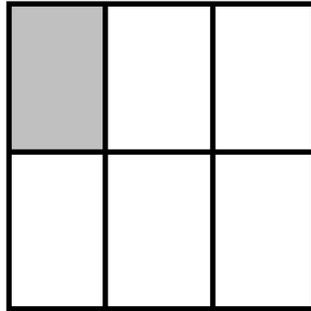
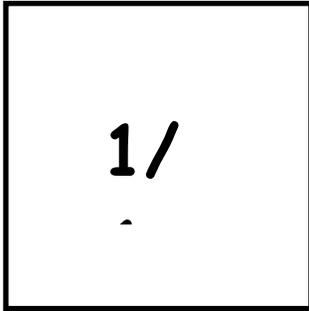
$\frac{1}{4}$ Grouping Cards



1/5 Grouping Cards



1/6 Grouping Cards



It's Their Birthday

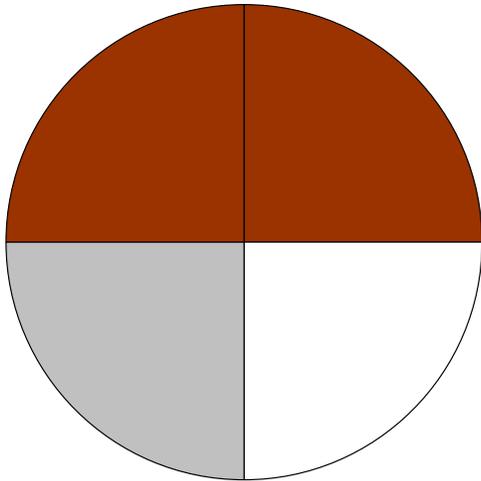


Josh and Justin are twins who are very excited about celebrating their 12th birthday. They couldn't decide on the

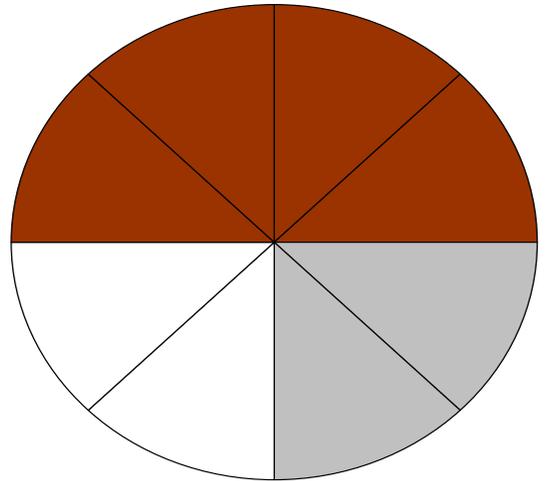
flavor of the frosting, so they have three flavors. Their mom ordered a cake frosted with $\frac{1}{2}$ chocolate, $\frac{1}{4}$ vanilla, and $\frac{1}{4}$ strawberry frosting.

You are the bakers. Working with a partner, use fraction circle/squares to create a cake with equivalent fractional parts.

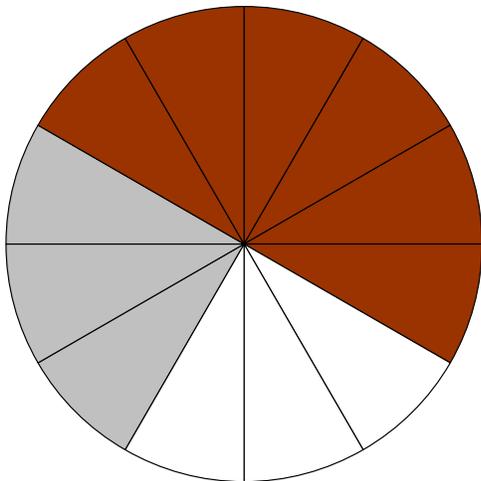
Birthday Cake Answer Key



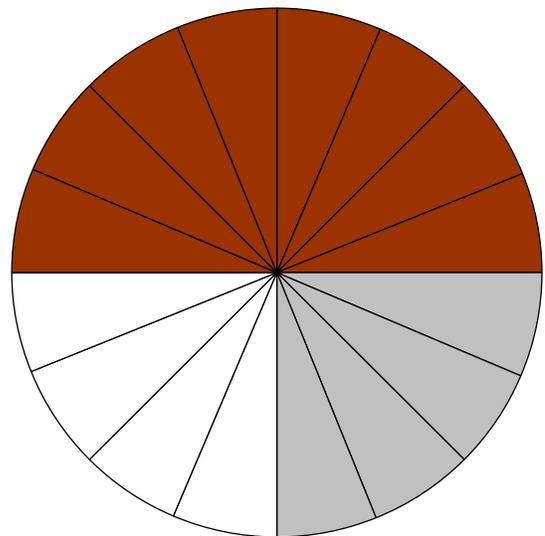
$\frac{2}{4}$ chocolate
 $\frac{1}{4}$ vanilla $\frac{1}{4}$



$\frac{4}{8}$ chocolate
 $\frac{2}{8}$ vanilla $\frac{2}{8}$



$\frac{6}{12}$ chocolate
 $\frac{3}{12}$ vanilla $\frac{3}{12}$



$\frac{8}{16}$ chocolate
 $\frac{4}{16}$ vanilla $\frac{4}{16}$
strawberry

$$\frac{3}{5}$$

$$\frac{1}{3}$$

$$\frac{2}{4}$$

$$\frac{6}{8}$$

$$\frac{4}{13}$$

$$\frac{7}{12}$$

Set 2

1

2

2

6

1

3

2

3

4

6

3

6

Set 3

$$\frac{4}{5}$$

$$\frac{1}{5}$$

$$\frac{1}{7}$$

$$\frac{2}{14}$$

$$\frac{2}{10}$$

$$\frac{8}{10}$$

Set 4

$$\frac{1}{2}$$

$$\frac{1}{3}$$

$$\frac{1}{4}$$

$$\frac{1}{5}$$

$$\frac{1}{6}$$

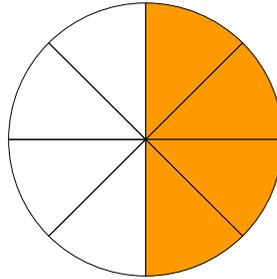
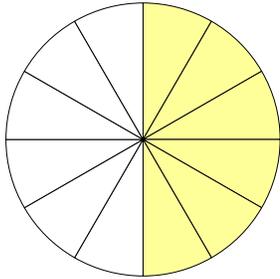
$$1$$

Answer Key

Name _____ Date _____

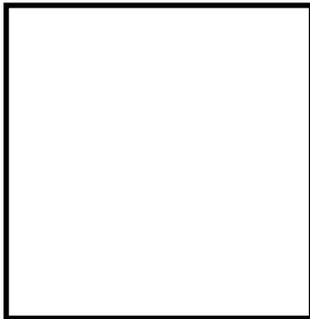
1. Color each circle to show an equivalent fraction to the fraction named. Write the equivalent fraction.

$$\frac{1}{2} = \frac{4}{8}$$



2. Shade the first square to represent the fraction 3/12. Shade the second square to represent a fraction equivalent to 3/12.

$$\frac{3}{12} = \frac{1}{4}$$



Answers will vary.

3. Complete the chart by writing two equivalent fractions in each column.

<u>Equivalent Fractions</u>		
1/2	1/3	1/4
3/6 4/8 5/10 6/12	3/9 4/12 5/15 6/18	2/8 3/12 4/16 5/20
or any fraction equivalent to 1/2.	or any fraction equivalent to 1/3.	or any fraction equivalent to 1/4.

4. Your class was having a discussion about equivalent fractions. Trevor said that $4/16$ is greater than $1/4$. Samantha said that $4/16$ is equal to $1/4$.

Part A

Is Trevor or Samantha correct? Samantha

Part B

Use what you know about equivalent fractions to explain why your answer is correct. Use words, pictures, and/or numbers in your explanation.

If fractions are equivalent they are the same size and the same distance from zero on the number line. I can show that $\frac{1}{4}$ is equal to $\frac{4}{16}$ by drawing two congruent squares. I can divide one square into 4 equal parts and color 1 part to show $\frac{1}{4}$. I can divide the second square into 16 equal parts and color four parts to show $\frac{4}{16}$. If I compare the size of the two parts they are equal.

Or

I can draw a number line from 0 to 1 with intervals showing sixteenths. I can label the number line on the fourth out of the sixteenth space as $\frac{4}{16}$. I can then locate fourths on the number line by looking at groups of 4 intervals and label $\frac{1}{4}$. $\frac{1}{4}$ and $\frac{4}{16}$ will be on the same place on the number line.